Education Management using Blockchain as Future Application Innovation

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Abstract

This paper means to give a precise writing audit on blockchain innovation in training to offer a definite comprehension of the current situation as far as advantages, boundaries, current uses of blockchain innovation and future regions where blockchain innovation can be carried out in different spaces of schooling. A bibliometric investigation was performed for information in distributions, diaries, creators and gathered references, and checked by applying bibliometric measures. The investigation shows that blockchain innovation in schooling is as yet a youthful discipline, yet has a great deal of potential to help the training area on the loose. This examination gives an establishment to instructive organizations, strategy creators and specialists to investigate different regions where blockchain innovation can be executed, albeit this exploration additionally recommends some potential employments of blockchain innovation in different elements of the training framework, more applications can be brought into the schooling framework to exploit the capability of blockchain innovation. This paper examines the use of blockchain in innovation in schooling with the assistance of bibliometric examination. This is one of the main realized investigations to survey blockchain innovation by distinguishing the current advantages, boundaries, and utilizations of blockchain innovation.
Keywords: Blockchain Technology, Innovation, Education.

1. Introduction

Blockchain technology can eliminate third-party intermediaries and allow direct verification and transactions. Blockchain technology has the progress that can be categorized into four generations, namely Blockchain 1.0, 2.0, 3.0, and 4.0.

Blockchain 1.0 is the first widely used cryptocurrency for foreign exchange payment systems, small-value payments, one-to-one cash payment systems, etc. Blockchain 2.0 enters with smart contracts, various fees, banking matters, and various fields of finance. While Blockchain 3.0 is focused on blockchain management in government applications, health

technology, and the arts[1]. Blockchain 4.0 is decentralized, and information technology can conduct and operate on blockchain-based businesses and support the management of finance, assets, and so on[2].

Blockchain technology is reliable and the decentralized network transforms the database of all transaction records[3]. The things that are broken in the blockchain do not affect the whole network and it is certain that a high trust of the application will be made on the blockchain technology[4]. The network of nodes on the blockchain works very securely and efficiently whose course is regulated by procedures.

Due to the unique capabilities of blockchain, it has been used in various sectors such as finance, government, education, tourism, energy, etc. Higher education around the world is also deeply exploring blockchain and technology in the business field outside of governance and which is currently rolling in society. Blockchain technology has been defined based on its features and uses in educational settings.

The blockchain innovation structure has solid network safety capacities that have been utilized in different areas[5]. The utilization of blockchain innovation in instruction is in its beginning phases. Moreover, blockchain in instructive settings is a framework used to issue, approve and share testaments. An advanced, decentralized, open record of all cryptographic information trade innovation in an instructive climate can make people the overseers of their authority scholastic records to effectively impart their qualifications to every invested individual. The advancement of blockchain in schooling has been trudging; things like e-records, computerized degrees, and confirmations might have been exceptional created. This assistance can possibly propel instruction.

Our paper contains a systematic literature review on blockchain technology in education to share a detailed understanding of the current and future benefits and challenges of implementing Blockchain technology in the education sector. Our paper contributes to the literature on the application of blockchain technology[6] and its potential future applications in education[7]. And we have a conclusion offering for policymakers in higher education institutions, academics, managers, and researchers to use the potential benefits of blockchain technology for the benefit of the education sector[8].

2. Research Method

The motivation behind our exploration is to deliberately look at the examination writing that quantitatively or subjectively contemplates blockchain innovation in instruction[9]. Blockchain innovation can be utilized for picking up, showing offices, authoritative administration for school instruction, and advanced education with the assistance of writing survey concentrates, so the advantages of innovation can be investigated[5][5].

The following research questions guide this systematic literature review (SLR)
RQ1. How can blockchain enter the world of education?
RQ2. What are the methods used on the blockchain?
RQ3. What are the benefits of implementing blockchain technology?

2.1 Activity 1: Education database search

Various research objectives regarding the use of blockchain can be identified by searching the SCOPUS database in the author's university library[10]. Initial searches were carried out using keywords, namely "blockchain" "technology" in "education." In total, we found 100 documents containing articles, review papers, books, book chapters, editorials, and conference papers[11]. The document includes keywords about blockchain.

2.2 Activity 2: visualization check

Related articles are identified and do not include off-topic articles. The inclusion criteria of articles considered for further study are conferences, conference papers, book chapters, and editorials. The reports contain blockchain technology in education and or use in education[12].

2.3 Stage 3: analyzing the content
At the end we research and analyze the content of the main article and systematically review the selected research articles and review the paper by examining the aims, methods, and content of the innovation of the paper. We present various excerpts of articles from publications to better understand the current state of technological development.

3. Literature Study

Blockchain technology is part of the Industrial Revolution 4.0 that is happening in various countries. Cryptocurrency is considered a secure method because it is without intermediaries or third parties[13]. Blockchain will be applied in all major research areas including banking, education, government and health. Another study found that blockchain implementation is immature and the public who knows it is not yet widespread, making it difficult to have a true vision and future potential. Scalability, smart contract security, and user adoption are believed to bring blockchain technology to significant changes especially colleges, universities, and society[14][15].

In detail the literature explains that blockchain is a growing field of study that has tremendous applications in education[16]. various benefits can be felt and an example lies in managing student credential data, administration and university teaching using an online system. Besides being used in the fields of education, engineering medicine, logistics, retail, marketing, and finance, blockchain technology is also applied. Furthermore, the various areas as in Figure 3 present a dotted distribution of publications in those areas. This graph shows how blockchain technology started to gain attention since 2017 from where it has been growing consistently and seems to be growing for the foreseeable future[17].

It very well may be seen that the vast majority of the distributed work was distributed in diaries on science and innovation, medication, advertising, school, and college law. This proposes that block innovation and its application in schooling is a multidisciplinary research region[18]. Besides, the quantity of distributions is restricted to a limit of three distributions for every diary. This proposes the need to additionally investigate the distributing area in school training, online instruction, and subjects identified with the sociologies, business, and the executives training[19].

4. Result and Discussion

Authors	Purpose	Methodology	Findings
Untung Rahardja et al (2021)	The Potential Utilization of Blockchain Technology	Review Paper	The utilization of blockchain advancement in E-business.
W Setyowati et al (2021)	DESIGN FINANCIAL ACCOUNTING USING BLOCKCHAIN APPROACH IN EDUCATION	Review Paper	Blockchain has been applied in numerous spaces of digital money, bookkeeping and schooling administration.
Achmad Nizar Hidayanto et al (2021)	Immutable Ubiquitous Digital Certificate Authentication Using Blockchain Protocol	Systematic Literature Review	the job of blockchain in upgrading e-endorsement information security, it is demonstrated

			that organization can be all around dispersed and decrease functional expenses for each field on the planet.
Mustofa Kamil et al (2021)	e-voting blockchain concept implementation	Systematic Literature Review	utilization of a blockchain-based E-casting a ballot framework to assist with handling political race turmoil during Covid-19.
Daelami Ahmad at al (2021)	Immutability Framework Design in E-Government of Blockchain Technology	Systematic Literature Review	Decide the limit of Blockchain innovation in recording exchanges that happened in the record and overall it additionally offers the public authority to be applied to the e-Government area which can build information straightforwardness, stay away from extortion, and increment public confidence in the public authority.
Untung Rahardja et al (2021)	Immutability of Distributed Hash Model on Blockchain Node Storage	Systematic Literature Review	immutable blockchain node storage distributed hash model
Alwiyah Alwiyah et al (2021)	Socio-economic impact of Blockchain utilization on Digital certificates	Systematic Literature Review	This examination is a compelling advanced declaration distributing action by using blockchain innovation. By executing decentralized frameworks and cryptography claimed by the blockchain, it will possibly expand the instructive advancement space

			in Indonesia.
Edward Guustaaf et al (2021)	Blockchain-based Education Project	Systematic Literature Review	This paper will zero in on the convention utilized in this project and investigate a few blockchain-based advanced education projects
Qurotul Aini	Blockchain Technology Pattern QR Code for an Authentication Certificate	Systematic Literature Review	The job of blockchain innovation in the realm of training is to test the legitimacy of recognitions, the expanding number of phony certificates for an interest, both for work and proceeding with instruction to a more significant level

5. Conclusion

Blockchain innovation gives a protected disseminated record that offers a decentralized, secure, dependable and straightforward framework. Blockchain innovation is as of now just applied in a restricted space of education, however its latent capacity is still generally undiscovered. Albeit a wide assortment of instructive stages arose rapidly, progress was slow. The fruitful presentation of blockchain innovation can't happen without eliminating obstructions. The record adds to the abundance of existing information by featuring the current turns of events, advantages, difficulties and utilization of innovation in the instructive climate. There is a pattern of expanding the quantity of distributions and references in this field in regards to late turns of events. Furthermore, the main number of distributions came from the United States, trailed by India and Russia.

This review infers that the utilization of blockchain in training the board is as yet in its beginning phases. Nonetheless, it is quickly acquiring energy in different spaces of instruction, for example, endorsement the executives, computerized guardianship endorsements, including advancing community learning conditions.

Future exploration could cover the execution of blockchain innovation in the instruction area and cover a more extensive region. Ideas for additional exploration that blockchain can be applied well in different areas not just the instruction area.

References

[1]   C. Lukita, M. Hatta, E. P. Harahap, and U. Rahardja, "Crowd funding management platform based on block chain technology using smart contracts," *J. Adv. Res. Dyn. Control Syst.*, vol. 12, no. 2, 2020, doi: 10.5373/JARDCS/V12I2/S20201236.

2]   Q. Aini, A. Badrianto, F. Budiarty, A. Khoirunisa, and U. Rahardja, "Alleviate Fake Diploma Problem In Education Using Block Chain Technology," *J. Adv. Res. Dyn. Control Syst.*, vol. 12, no. 2, pp. 1821–1826, 2020, doi: 10.5373/JARDCS/V12I2/S20201225.

[3]   T. Ayuninggati and E. P. Harahap, "Supply Chain Management, Certificate

Management at the Transportation Layer Security in Charge of Security," *Blockchain Front. Technol.*, vol. 1, no. 01, pp. 1–12, 2021.

[4]   R. M. H. Thamrin, E. P. Harahap, A. Khoirunisa, A. Faturahman, and K. Zelina, "Blockchain-based Land Certificate Management in Indonesia," *ADI J. Recent Innov.*, vol. 2, no. 2, pp. 232–252, 2021.

[5]   E. Febriyanto and R. S. Naufal, "Attitude Competency Assessment in the 2013 Curriculum Based On Elementary School Prototyping Methods," *IAIC Trans. Sustain. Digit. Innov.*, vol. 1, no. 1, pp. 87–96, 2019.

[6]   A. Williams and E. Dolan, "Application of Blockchain Technology in e-LoA Technopreneurship Journal," *Aptisi Trans. Technopreneursh.*, vol. 2, no. 1, pp. 98–103, 2020.

[7]   G. Chen, B. Xu, M. Lu, and N.-S. Chen, "Exploring blockchain technology and its potential applications for education," *Smart Learn. Environ.*, vol. 5, no. 1, pp. 1–10, 2018.

[8]   M. Kamil, U. Rahardja, P. A. Sunarya, Q. Aini, and N. P. L. Santoso, "Socio-Economic Perspective: Mitigate Covid-19 Impact on Education," in *2020 Fifth International Conference on Informatics and Computing (ICIC)*, 2020, pp. 1–7, doi: 10.1109/ICIC50835.2020.9288577.

[9]   A. Muhtadibillah, H. T. Sukmana, and N. F. Rozy, "An Evaluation Of Helpdesk With Gamification Using Indeks Kepuasan Masyarakat (IKM)," *IAIC Trans. Sustain. Digit. Innov.*, vol. 1, no. 1, pp. 8–17, 2019.

[10]   C. Cassandra, H. A. E. Widjaja, H. Prabowo, E. Fernando, and Y. U. Chandra, "A Blockchain Technology-Based for University Teaching and Learning Processes," in *2020 International Conference on Information Management and Technology (ICIMTech)*, 2020, pp. 244–247.

[11]   S. Watini, Q. Aini, A. Khoirunisa, and U. Rahardja, "Assessment System for Testing the Evaluation of Diversity in Traditional Malay Dance by Early Childhood Students," *Int. J. Psychosoc. Rehabil.*, vol. 24, no. 8, pp. 2721–2729, 2020, doi: 10.37200/IJPR/V24I8/PR280291.

[12]   U. Rahardja, E. P. Harahap, and S. R. Dewi, "The strategy of enhancing article citation and H-index on SINTA to improve tertiary reputation," *Telkomnika (Telecommunication Comput. Electron. Control.*, vol. 17, no. 2, pp. 683–692, 2019, doi: 10.12928/TELKOMNIKA.V17I2.9761.

[13]   Z. Cullen and C. Farronato, "Outsourcing tasks online: Matching supply and demand on peer-to-peer internet platforms," *Manage. Sci.*, 2020.

[14]   Q. Aini, M. Budiarto, P. O. Hadi Putra, A. Khoirunisa, N. P. L. Santoso, and U. Rahardja, "Gamified education practice: Designing with e-commerce and ilearning concept," *Int. J. Psychosoc. Rehabil.*, vol. 24, no. 7, 2020, doi: 10.37200/IJPR/V24I7/PR270799.

[15]   U. Rahardja, S. Sudaryono, N. P. L. Santoso, A. Faturahman, and Q. Aini, "Covid-19: Digital Signature Impact on Higher Education Motivation Performance," *Int. J. Artif. Intell. Res.*, vol. 4, no. 1, May 2020, doi: 10.29099/ijair.v4i1.171.

[16]   U. Rahardja, Q. Aini, M. D. A. Ngadi, M. Hardini, and F. P. Oganda, "The Blockchain Manifesto," 2020, doi: 10.1109/ICORIS50180.2020.9320798.

[17]   M. Prawira, H. T. Sukmana, V. Amrizal, and U. Rahardja, "A Prototype of Android-Based Emergency Management Application," *2019 7th Int. Conf. Cyber IT Serv. Manag. CITSM 2019*, 2019, doi: 10.1109/CITSM47753.2019.8965337.

[18]   M. Aziz and M. Aman, "Decision Support System For Selection Of Expertise Using Analytical Hierarchy Process Method," *IAIC Trans. Sustain. Digit. Innov.*, vol. 1, no. 1, pp. 49–65, 2019.

[19]   H. Haris and N. Priliasari, "THE DESIGN OF WEB-BASED TRAINING MANAGEMENT INFORMATION SYSTEMS AT PT. SINTECH BERKAH ABADI," *ADI J. Recent Innov.*, vol. 2, no. 2, pp. 269–274, 2020.